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ABSTRACT

Prepared as part of a series applying recent research in oral and written communication instruction to classroom practice, this booklet describes five situations where writing and speaking experiences are used as a way to learn subject matter. The first section of the booklet describes the learning that takes place in the home, where writing and speaking are tools used to question, express, entertain, solve, record, amuse, explore, and discover. The second section describes the writing and speaking activities occurring in a fifth grade class studying the Renaissance, while the third analyzes the interactions in a high school science class. The fourth section offers observations of a ninth grade mathematics class in which students spent the last 12 minutes of class writing about their feelings and conversed daily about their work. The fifth section describes a high school behavioral science class in which students learned through actions as well as books. Each section contains additional activities related to the subject area discussed. (FL)

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Learning Better, Learning More: In the Home and Across the Curriculum

By Christopher J. Thaiss

The Talking and Writing Series, K-12: Successful Classroom Practices

ED233383

The purpose of this series is to provide information to assist teachers and curriculum planners at all grade levels in improving communication skills across the major disciplines.

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Compiled and Edited

by

Dingle Associates, Inc.
Clarence M. Johnson, Editor
Anne H. App, Assistant Editor

The U.S. Department of Education
T. H. Bell, Secretary

Office of Elementary and Secondary Education
Lawrence F. Davenport, Assistant Secretary

Office of State and Local Educational Programs
James G. Horn, Director

Division of Educational Support
George R. Rhodes, Jr., Director

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PREFACE

During the past decade, teachers, education administrators and researchers, and the general public have become increasingly concerned about students' ability to communicate. This broad public concern for improvement in education led to the enactment of Title II, Basic Skills Improvement Act, Public Law 95-561. The Basic Skills legislation encourages Federal, State, and local education agencies to utilize " . . . all available resources for elementary and secondary education to improve instruction so that all children are able to master the basic skills of reading, mathematics, and effective communication, both written and oral." Section 209 of the act specifically authorizes the Secretary of Education to collect and analyze information about the results of activities carried out under Title II. Thus, improved instruction in the basic communication skills—speaking, listening, and writing—has become the focus of programs and research projects throughout the country.

The booklets in this series, *The Talking and Writing Series, K-12: Successful Classroom Practices*, provide information to assist teachers and curriculum planners at all grade levels to improve communication skills across all major disciplines. Developed under a contract with the U.S. Department of Education, the 12 booklets apply recent research in oral and written communication instruction to classroom practice. They contain descriptions of teaching practices; summaries and analyses of pertinent theories and research findings; practical suggestions for teachers; and lists of references and resources. Also included is a booklet on inservice training which suggests how the series can be used in professional development programs.

The booklets were developed through the efforts of an Editorial Advisory Committee comprised of 14 professionals in both the academic and research areas of written and oral communication education. The group worked with the sponsoring agency, the Department of Education's Basic Skills Improvement Program, and Dingle Associates, Inc., a professional services firm.

The committee members, in consultation with the Department of Education staff, chose issues and developed topics. Ten of the 14 committee members authored papers. The committee reviewed the papers and provided additional expertise in preparing the final booklets, which were edited and designed by Dingle Associates.

We are grateful to the committee members, advisors, and all others who contributed their expertise to the project. The committee members were:

Ronald R. Allen*
University of Wisconsin

Don M. Boileau
Speech Communication Association

Pamela Cooper*
Northwestern University

Joseph Dominic
National Institute of Education

Barbara Lieb-Brilhart
National Institute of Education

Nancy S. Olson*
Association for Supervision and Curriculum Development

Linda J. Reed*
CEMREL

Donald L. Rubin*
University of Georgia

* Authors

Marcia Farr*
University of Illinois (formerly National Institute of Education)

Robert A. Gundlach
Northwestern University

Kenneth J. Kantor*
University of Georgia

Jana Jo Staton*
Center for Applied Linguistics

Charles A. Suhor*
National Council of Teachers of English

Christopher J. Thaiss*
George Mason University

It is hoped that the booklets in this series will be valuable to classroom and administrative professionals in developing or restructuring their communication skills programs. They may also be useful to community and parent groups in their dialogue with members of the educational system. The ultimate benefit of this project, however, will be realized in our children's enhanced ability to communicate, both orally and in written language.

Sherwood R. Simons
Project Officer

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* Authors

LEARNING BETTER, LEARNING MORE: IN THE HOME AND ACROSS THE CURRICULUM

By

Christopher J. Thaiss
Associate Director
Northern Virginia Writing Project

George Mason University
4400 University Drive
Fairfax, Va. 22030

INTRODUCTION

Rich Gottfried, who teaches earth science and chemistry at Chantilly (Va.) High School, was asked how much "extra time" he spent having students write essay tests, rather than fill in blanks, and helping them develop group projects, rather than just lecturing. "Extra time?" he replied, puzzled. "It's not extra. That's how I teach, and that's how they learn. Of what use are facts about rocks and elements if students don't learn to think about those facts the way scientists do?"

This booklet is about teachers like Rich Gottfried, who have realized that students learn science—or math, history, or any other discipline—by *talking* about it and *writing* about it, as well as by reading texts and hearing others talk. These teachers apply to practice what researchers in different fields have been preaching for many years: Learning happens when you or I

- use our perceptions (e.g., through reading or listening) to solve problems important to us, and
- try to put those perceptions into *words* (spoken or written) so that others can use them and so that we ourselves will understand them.

It is easy to explain why students forget so quickly so much that teachers tell them: It is not that the data are irrelevant *or* that students lack intelligence; teachers simply rarely ask students to *use* data, except to give it back to them in undigested bits on so-called tests. Educators often defend this type of teaching by saying that it allows them to "cover material." Besides, they say, the students must first "learn the material before they can use it." But, as the teachers and researchers cited in this booklet believe, no one learns except by doing: In effect, *using* information precedes really *learning* it.

This booklet describes four classrooms where teachers and students use a treasury of writing and speaking experiences to learn subject matter: a fifth grade, a high school math class, a ninth-grade earth science class, and an 11th/12th-grade social studies class. The booklet covers actual classes-in-progress, teacher discussions on the motives behind their methods, and brief analyses of each class in terms of the theory that supports it. A short list of suggested classroom activities follows each analysis, as well as a short list of suggested reading.

Of course, the classes dramatized are atypical, in that these teachers are doing much more with time and for students than does the "typical" teacher. This booklet does not portray education in America, but learning as it *can* be and *is*—given teachers who understand how students learn best, and who apply that understanding in imaginative, compassionate ways. These classes *are* typical in that they contain students from varied ethnic, linguistic, and economic backgrounds; students "turned on" or "turned off" to school because of their very individual histories, relationships with parents, friends, former teachers. In other words, the successes of these teachers could happen anywhere.

Because the philosophy demonstrated here is just as important in the home as in school, the first section (by Ann Jeffries Thaiss) describes and analyzes writing and speaking to learn in a family setting. It illustrates the learning leaps that take place when wit, words, and a little time are applied.

WRITING AND SPEAKING TO LEARN IN THE HOME*

"We aeat cown mele for denr. We made soop. Ther was carrits and celrry with onunyin."

—Jimmy, age 6

"I cooked it and added certain spices to obtain a superior flavor."

—Jeff, age 10

A Pioneer Night, January 1982

Around 4 p.m., the Sunday activities began to wind down. The two older boys, Jeff, 10, and Jimmy, 6, went out into the snow with their father to gather kindling in the tiny grove near their home. Toddler Christopher, 2, was finishing a color-alphabet game with his mother. After wood was laid on the hearth, Jimmy brought in two bowls of snow to be melted for hand-washing.

By 4:30, the dinner was underway. Jeff filled the large Dutch oven with water and added dried split peas, lentils, and two frozen chicken wings. Then came the mixed vegetables that Jimmy had cut up and Christopher had placed in a bowl. Soon, the soup pot began to boil, and the first sips of what would turn out to be a delicious broth were tried. Jeff decided to add salt and garlic for flavor. As Jeff stirred, Jimmy mixed ingredients for wheat and cornmeal muffins. Christopher interrupted his wide-eyed gaze with shouts of "Dum! Dum!" (Give me some!)

Jeff: Do you think this needs more spices?

Daddy: (tasting) I think it could use more salt. What do you think, Jimmy?

Jimmy: (tasting) Yup. A little salt.

Daddy: What did the pioneers use to preserve their food?

* This section was written by Ann Jeffries Thaiss.

Jeff: Salt. Yum, I'd love to have some salted ham.

Jimmy: Like the ones hanging at Monticello and Turkey Run Farm!

Mommy: Right, Jimmy. But I'm afraid that it would be salty beyond your imagination. I bet you'd find it tasted terrible by our standards.

Daddy: Where did the pioneers get salt?

Jimmy: In the sea.

Jeff: They'd have to get tons and tons of water just to get an ounce of salt!

Daddy: What about the pioneers who didn't live near salt water?

Jeff: They'd get it from the ground.

Mommy: Do you know what that's called? (No response.) Natural salt licks. They were very important in pioneer life.

While the soup cooked and the muffins baked, the three boys handed their father kindling, which he arranged in the fireplace. The two older boys wanted him to rub two sticks together—"Just like a real pioneer!"—but, though he tried it for a couple minutes, he acquiesced to expedience and used a match. Candles were also lit as Mommy dished up food and brought it to the table in front of the fireplace. Herbal tea was brewed, and the family settled down to the evening meal and conversation about the lives of Virginia pioneers.

Jeff asked if there were pioneers around Charlottesville (his favorite city), and this question led to a study of the family atlas and the topography not just of Virginia, but of the entire United States. Jimmy wanted to know the distance from Oakton to Chicago (where Jeff was born), and Daddy showed him how to use the mileage legend to figure distance on a map. Christopher finished his meal and asked for more tea. Daddy asked what other drinks Virginia pioneers might have had. Tea and apple cider were voted probable favorites, with coffee an extreme rarity, milk a luxury, and orange juice unheard of.

Christopher began to play with one of the bowls of melting snow and Jeff pointed out that the water looked dirty, almost like mucus. Both Jeff and Jimmy agreed that *they* would not want snow cones made out of this snow.

Mommy asked why the snow was so dirty, and Jeff explained that it was because of all the pollution in the air from cars, trucks, and industry. And Jimmy decided that pioneer children could have eaten real snow cones.

Christopher was nursed to sleep (in true pioneer fashion!). As Jimmy drew pictures by firelight, Mommy suggested a brainstorming session in which everyone would try to name as many things as possible that might have been found in a pioneer home. In no time, the list numbered 102 items, including a Bible, a stickhorse, wooden spoons, lard, and a spinning wheel. Everyone participated, and the more things that were named, the more excited everyone got, wanting to reach the set goal of 100.

A discussion about what the pioneers might have done for fun followed. The children thought of stickball, fishing, hide-and-go-seek, and hiking. Daddy mentioned storytelling and how songs were passed from one generation to the next. He brought out his guitar and accompanied Mommy singing some old folk songs: "Black Is the Color of My True Love's Hair," "Dona, Dona," and Jeff's favorite, "Barbara Allen."

The evening concluded with everyone writing about this special time together. Jeff and his father wrote descriptions, Mommy reflected in her diary, and Jimmy wrote, as a pioneer boy, to an imaginary cousin, "Charley Slikeman," who lived in Philadelphia.

DEAR CHARLY IT IS VERY COLD.
WE WENT TO THE STREEM TO GIT
KINDALING. WE POD A LOT!
WE DUG AND DUG. IT WAS HURD.
IT DRID FAST!
WE AEAT COWN MELE. FOR
DENA. WE MADE SOOP. THER WAS
CARRITS AND CELARY
WITH ONUNYIN. WE DESCRIBED
THEINGS. IT WAS VERY FUN.
WE GOT 100 WRDS ON THE PAPRE
THINGS IN PIANERE HOMES.
I LIKETE THE BERROL AND THE STIKOS
HORS. LOVE JIMMY

Today was pioneer day.

At about 4:00 o'clock my brother, father, and I collected fire wood.

After that we made dinner. We had fresh vegetable meat soup. I cooked it and added certain spices to obtain a superior flavor. Also we ate potatoes, which my father prepared and rolls which my brother made. We could not use lights so we burned a candle a candle past 8:00 o'clock. (a)e made a nice warm fire. So with the dishes clean and the table cleared we just started talking. Then we looked at the Rand McNally map of Virginia and looked at the places the pioneers would be living. Then we tried to make all the things a pioneer family would have in their home and we needed 162! That took about half an hour. So then we just sat around the fire and my parents sang and then we the sang sang.

Analysis

This sharing among family members shows the lively learning that takes place so easily in the home. The family made no elaborate plans for the evening; they simply decided to stop their usual activities at a prescribed time and spend the evening focused on a central theme. The flow of ideas in this illustration follows the boys' natural interests. Ideas "fit" like the many pieces of a jigsaw puzzle, creating a unified learning experience bound to be more easily retained by the children than if ideas were presented and explored in isolated segments according to subject matter. Note the different areas discussed: American history, science, home economics, sociology, communications, music, geography, map reading, drawing, writing, to name a few. The tools used were simple; no expensive equipment was used or needed. Such "hands-on" activities as wood-gathering, cooking, fire-building, drawing, accompanied by the give-and-take between children and parents, provided many natural opportunities for discussion, and were exercises in imagination, logic, and intuition. Music provided not only a lesson in oral history, communication, and social life, but it also enhanced the atmosphere, creating an impression which reading alone could not have provided.

Aaron Stern, in his remarkable book, *The Making of a Genius,* described many such learning sessions with his daughter, Edith, and his son, David. Stern termed his work, "Total Educational Submersion." In the introduction to the reprinted edition of this book, T.E.S. has been described by John M. Flynn (1977): "The methodology is basically an individualized instruction approach—one which takes the child where it finds him, capitalizes on the child's interests, and uses as instructional materials both books and the environment . . . . I believe that it incorporates a flexibility which is not often present in other current approaches. For example, the method is quite opportunistic in capitalizing on the child's interest." The key word, "opportunistic," accounts for the successes that Stern enjoyed with his children, and with the many other children that he has worked with over 20 years.

Children love to learn. Letting the child guide the parent creates the most fruitful atmosphere for learning.

The use of writing/drawing in this project was not just a means to record; it helped to fuse ideas. Jeff's description of the evening provided him a chance for immediate reflection (and feedback) on what he did and what he learned. Jimmy's decision to write to an imaginary cousin, "Charley Slikeman" (a name he chose), gave him a chance to organize information and to fantasize about what he would have to say were he a pioneer boy himself.

Thus, writing and speaking were the tools used to question, express, entertain, solve, record, create, amuse, explore: discover.

Family activities can be organized around any interest a child may have. Pioneer Night could just as easily be turned into a night in a medieval castle, a day in a major league dugout, a trip on Noah's ark, or a day with George Washington. And no extra time needs to be set aside for such activities; every day, parents and their children share much time doing household chores, shopping, driving, standing in lines, and other activities. Any of these times is a wonderful opportunity to probe a child's mind, encourage questioning, spark his or her imagination. Any time can be special for a parent and child to discover together.

More ideas

- **Charades is always a wonderful family activity.** Have participants pretend that they are historical figures, or have them act out book titles, events, and so forth.

- **Choose five or six household items** (spoon, screwdriver, box, toothbrush, pan). Have each family member try to name as many uses as he or she can for each. Practical uses as well as imaginative ones should be encouraged. For example, a spoon could be the temporary home of a cold virus, a screwdriver could be a lightning rod for a gnome home. This helps push imagination and problemsolving to the limit, thus enabling the child to view the world in new ways.

- **Have children play "newspaper reporter"** and interview their parents about their childhood. The child might then write an article based on the interview.

- **Have a family "letter-write."** Everyone writes to a favorite relative or friend. Very young children can draw pictures. All share their work. A variation: Each member chooses an admired person—baseball player, actor, politician, journalist—and writes a letter to send to that person. The whole family will enjoy the responses received.

- **Family spelling bee**: After children are quizzed, see if they can stump parents (with the help of a dictionary if necessary). A great game

on car trips—with the winner promised a special treat at the next stop.

- **Play "What would you do if . . . "** (you were lost at the airport, saw a dinosaur, met the President, etc.). This game develops imagination and logic.

- **Each week share current reading interests.** "I'm reading _____, and this is why I (dis)like it." For children too young to read, use part of this time reading to them or asking older children to read to them.

- **Have a round-robin storywriting session.** Each family member starts a story by writing an introductory paragraph. Then everyone hands his or her story to another and writes more. If you choose, pass the stories around more than once. Then enjoy the results. For those too young to read and write, a parent or older sibling can read aloud and take dictation, so that everyone can participate.

- **Encourage children to share their talents with others.** A 10-year-old can read on a regular basis at a local nursing home. The nursing home resident has much-needed company, while the child gives and strengthens his or her sense of self.

SUGGESTED READING

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_____. *The Joy of Learning.* North Miami Beach: Renaissance Publishers, 1977.

"GUESS WHO I AM, THEN I'LL GUESS YOU": WRITING AND SPEAKING TO LEARN IN FIFTH GRADE

Tom Watson's class at Haycock School has been studying the Renaissance. A week ago, the children were asked to assume roles of famous Renaissance figures and to compose one or more entries of a hypothetical diary kept by the person each chose. This day, the children are presenting these diaries. Some will be selected by the students to be read aloud to the entire class: all children will present their individual diaries to small peer groups.

When Watson announces that group work will begin, the children quickly move to familiar areas of the classroom and circle their desks in groups of fours and fives. They begin chattering ("Who did you choose?" "Guess who I am, and then I'll guess you.") even before Watson repeats the often heard instructions: "Remember, make sure that everyone has a chance to read . . . and after each person has read, remember to give him or her some comments about the diary." He adds, "Then as a group, decide on one or two of your diaries that should be read to the whole class."

The groups begin in earnest. The noise level rises, but none of the groups appears distracted by the others. In one group, Melody handles the job of organizer, reminding the group of its tasks and making sure that all are given equal time. Jeff reads first, then the others read clockwise around the circle. As usual, the group reading sparks some talk on wholly unexpected topics. For example, Matt, as Leonardo da Vinci, has just read a series of diary entries about his painting the Mona Lisa. Dylan says: "Hey, I heard that some people think Leonardo painted her in the nude!" [Laughter.] "No really, and they want to strip away the layers of paint, using a computer."

Colleen: They what?

Jeff: That's dumb. They'll ruin the painting.

Dylan: No, that's why they use the computer. So they could repaint it with the exact colors.

The discussion continues until Melody reminds the others that two diaries have yet to be read. When all have finished and heard comments, it is time for the group to choose one or two diaries to be read to the entire class. Each suggests a different diary as the best, so they call on Watson to settle the quandary. He tells them that they need not decide; rather, anyone may read. This satisfies the group, which now turns its attention to the rest of the class.

Over the next half hour, the diaries of eight luminaries are read: Michaelangelo (Arthur), Queen Isabella (Eric), Shakespeare (Anushka), Dante (Dhananjai), and two each by would-be Galileos (Jeff and Michael) and Isaac Newtons (Mitchell and Will). Each reading brings questions and comments from the children. The teacher points out a particularly clever

aspect of each reading: for example, Dante's relief at having finally finished the *Divine Comedy* and Shakespeare's keeping a newspaper review of his first production! The two Galileos point up different and equally remarkable facets of his biography: the first, his brilliant astronomical discoveries; the second, his excommunication and threatened execution by the Catholic Church.

Now, the teacher transforms the discussion into a brainstorming session for the project based on the diaries: dialogues. These will be written and delivered by pairs of students, each continuing in his or her chosen character. Over the next week, the children will develop the dialogues, with some class time allotted for the writing. Each pair will have a choice of purposes: either to debate which of the two characters made the greatest contribution to civilization or to show how each one epitomized the "spirit" of the Renaissance.

Facilitating this second thrust is one purpose of the brainstorming. As the teacher explains, "I'd like you to think of adjectives we could use to describe the spirit, or mind, of the Renaissance." Soon, the board is covered with terms. Among them are: "complex," "reborn," "curious," "primitive—compared to now," "creative," "smart," "discovering," "powerful," "adventurous," "determined." Now, the teacher takes the thinking another step: "I want you to look over the list and try to find three that seem to encompass all of them." Dylan suggests "complex, reborn, and interested;" Ellen says "interesting, adventurous, and discovering." After each suggested trio, the teacher asks the student to explain his or her choices. "Discovering" provokes a substitution: "I like Ellen's list," says Jeff, "but I think 'powerful' should replace 'discovering'. Without power no discoveries would have been made." Thus, an issue is raised: What is the relationship between power and discovery? For 5 minutes, different views are exchanged, with at least a dozen students contributing fresh perspectives. Could Isabella have funded Columbus without the power to do so? No, but without Columbus, could Spain have become a power in the New World?

Watson brings the discussion to a close with the issue still under debate. He wants to give the class the few minutes left before the lunch bell to choose partners and begin designing the dialogues.

Analysis

In this scene, the language arts are used, not "covered." Writing and speaking, as well as reading and listening, are exploited as the natural means by which these fifth-graders learn history, biography, astronomy, physics, economics, politics, geography, and literature. The written and spoken word flourish in this class because they are *not* separated from the rest of the curriculum for "special attention," but are allowed to be used for their best purposes: problemsolving, group communication, and performance.

Moreover, they are used copiously and with variety, even in this one scene. The children present diaries within small groups, they orally analyze what they have heard, converse about new ideas, and revise their writing in response to the conversation. Within the large group, they perform the diaries, ques-

tion and answer questions, and orally analyze the spoken diaries. They do group brainstorming of ideas, orally synthesize the data, create impromptu arguments to defend their choices, and debate opposing views.

Finally, in pairs, they discuss the new task, and begin to draft the dialogues. The summary points up a third essential quality of how writing and speaking are used in the class: They are interwoven, continually reinforcing one another in what might be called a unified "languaging" process. The writing is meant to be spoken and to be spoken about; the talk leads to writing and further talk. Note also that the communication is multidirectional: student to student, student to group, teacher to student, student to teacher, group to teacher, and so on. The languaging process here gives each person many roles within the classroom community and helps to bind it together. It also frees the teacher from having to dominate the classroom. Moreover, the complex interaction creates its own rules and, to a great extent, its own discipline. Recall that, although the voice level was high during the small-group phase, it was not so high as to interfere with any of the small groups.

By relying so much on small- and large-group talk, and by having students perform so often, Tom Watson achieves two learning essentials: 1) Children identify themselves with what they are learning; and 2) important ideas get talked about and played with in many different ways. Consider, for example, the idea of the "Renaissance spirit." Another teacher might have culled a textbook definition and required students to memorize it for a test. The students would have no stake in the definition, and its terms would remain personally meaningless. However, by the time Watson asks students to suggest defining adjectives, they have already begun to define the Renaissance by having defined *themselves* through actual men and women of the time. Thus, the 30 or more adjectives that they suggest in the brainstorming session emerge from a rich store of their own experiences and reflections. When the teacher asks them to go the next mile—to synthesize the list down to three terms—they must use both their perceptions and those of classmates to achieve an idea that has meaning for the entire group. In short, they are doing history as professional historians and social philosophers do. Not only are they building up their treasuries of facts, they are developing complex modes of thought as well.

The interactions through talk and writing also give them a much better method of *testing* their knowledge than do usual school devices. The classroom give-and-take allows them easily to distinguish between a fact ("*Did* Galileo discover Uranus with his telescope?") and an opinion ("Give me an adjective that defines the Renaissance mind.")—a distinction that no fill-in-the-blank or multiple-choice tests can ever show. The methods used in this scene also give the student *instant* feedback, and of a most affecting kind. When Melody tells Jeff that he had forgotten to put a date on his Galileo diary, Jeff goes immediately to the classroom encyclopedia to check the facts. With the rest of the small group looking over his shoulder and chatting about the dates, Jeff discovers not only a suitable year, 1597, but also other facts about the mathematician/scientist that he will later incorporate into his dialogue.

More ideas

Writing and speaking to learn can be explored in the elementary classroom in innumerable ways. Here are a few suggestions, all of which include large- and small-group interactions and performance. None requires purchasing expensive materials.

- **The Roman Times and the Knightly News.** Small committees can make history come alive by designing their own one-page, "pasteup" newspapers on butcher paper or posterboard. Committee members research and write news, sports, and feature pieces. Projects are presented in class, then displayed.

- **At the town meeting.** The class becomes a hypothetical town, with a mayor and council (perhaps elected after candidates give campaign speeches). Small groups of "townspeople" meet to prepare "budget requests" on behalf of special interests—the public library, the hospital, a new shopping mall. These are researched, drafted, revised after group consultation, and presented at a town meeting. The council votes on percentages of budget for each interest. The class discusses process.

- **Great scientist's notebook**. Each student takes on the role of a famous (or fictitious) scientist noted for his or her "great powers of observation." An unfamiliar object is brought in for each person to observe and describe (for "the Royal Society" perhaps). Each tries to name the object. Then, in small groups, the descriptions are read and compared; each person takes notes on the other descriptions. The project can continue indefinitely, with each scientist adding more observations of phenomena and presenting them to his/her small scientific society. Contributions from each group may be mounted and displayed.

- **"If a kid has 20 baseball cards and loses 5 . . . "** Students can learn math principles and can write for outside audiences by creating booklets of verbal math problems for children in lower grades. This can be a class project, with small groups responsible for writing, discussion, and revising the problems. This project can be done from grade to grade throughout the school, with each "lower" grade writing "thank you" letters to the grade above. A variation on this theme is:

- **Let's go metric**. Here the class writes a guide for parents on converting to the metric system. Small groups can be assigned to explain various conversions: temperatures, measures, liquid weights, volumes. Other topics might include "Why go metric?" and "The

History of Our Measuring Systems." This project could conclude with a metric fair, at which each group reports to parents, perhaps using charts and other displays.

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"I WAS HIRED AS AN INDUSTRIAL SPY": WRITING AND SPEAKING TO LEARN IN HIGH SCHOOL SCIENCE

One of Rich Gottfried's most successful assignments divides his earth science classes into "geological teams" employed by rival oil companies. Each group of four is given some geological survey maps, a hypothetical "budget," and a challenge: "The chairman of the board wants you to decide if the company should drill for oil in this territory; if so, he wants to know where the wells should be and how deeply they'll have to be dug. Since this project will make or lose billions, you'd better be sure your conclusions are well supported. Your jobs are on the line."

Because the groups are working from data just as ambiguous as those facing actual field teams, this project is more than a test of whether students have assimilated textbook chapters and lecture notes. They must choose between viable alternatives, perhaps go out on a shaky limb. The group members must cooperate. Each group assigns smaller jobs according to the strengths of each person. One evaluates the topography, another the different strata of rocks, still another assesses the costs of drilling and production versus the expected oil supply. Sometimes, surprising jobs are created by a group. Once, Gottfried observed a student moving from group to group during a 50-minute skull session. When Rich asked what he was doing, the student replied, "My company hired me as an industrial spy."

During the several days devoted to group meetings, Gottfried visits each team. Since the group reports will ultimately come to him as "chairman of the board," students take this opportunity to try out on him their preliminary reports. He responds with questions that they still need to answer, and comments on data not clearly explained.

When the final reports come in 2 weeks after the initial assignment, he evaluates them for thoroughness, accuracy, clarity, and strength of reasoning. Since there are no "right answers," just plausible ones, no group can succeed in this project without having conscientiously weighed information and without having argued well. Besides Gottfried, the entire class assesses the reports.

When students in Gottfried's classes are tested, they write single-paragraph and multiparagraph responses, rather than fill in blanks or check printed choices. "After a 2- or 3-week unit, I might give a topic like, 'Write everything you know about rocks'; certainly, I'm looking for a good deal of information in their answers, but I think that even more, I'm hoping that the exercise will let them put the data into patterns, make connections between details. Also, I'm not looking for particular facts—you know, 'a, b, and c must be there'—students who write fewer details, but show a real grasp of how those connect, are just as successful as those who've memorized more data."

Gottfried also gives questions that demand a synthesis of different blocks of data: "I like comparative questions, such as, 'How are the properties of the halogens and the alkalines similar and dissimilar?' or 'Show the relationships among the contributions of four of the scientists we've studied.' "

In every writing students submit, he demands that they write in complete sentences. He complains that mere lists of data, which are acceptable in many science courses, encourage students to ignore the relationships between facts. "Writing sentences makes us think about the meaning of our observations. It's hard work. Students gripe about it at first, but once they see that they can do it—and how much it teaches them—they get to like it." On the other hand, he does not discourage them from lists or any other comfortable method for generating ideas on early drafts. "We talk from time to time about the problems people have getting started writing answers for labs. I draw a distinction between the writing people do to get their data and ideas onto paper and the writing they hand in."

As one would expect, Gottfried's lab reports differ from those in other classes, too. His students write what he terms "descriptive essays" (what theorists call "generalizations supported by instances"). Says Gottfried, "The traditional lab report includes statements of purpose, procedure, data, analysis, and conclusion. This would seem to ask the experimenter to achieve a synthesis based on data and then to organize the data to prove or disprove the hypothesis. But, in school practice, most of the analysis usually consists of math calculations, and the conclusion just restates the purpose. So, I tell my students that their conclusions have to *begin* with a thesis statement—the point the experiment has made—and then must go on to show how the data they've recorded supports the thesis."

To prepare classes for this format, he spends class time early in the year showing students how to come to a thesis based on experimental data. Students also practice the essay form. During the semester, he invites questions in class as students seek to learn the form. Much of his after-class conference time is devoted to helping individuals generate theses and organize data.

Does Gottfried sometimes feel that he is doing the English teacher's job by spending so much time on how students write? "Not really," he says. "I'm trying to help them learn science—and like it. They believe me when I say that 'doing science' is learning how to observe, how to make sense of the data, and how to express themselves. Even though many of the facts won't stay with them long after the course, they'll learn the important skills and be able to use them, no matter what fields they go into. So often, students leave science courses feeling that chemistry or physics or biology has nothing for them. I'm trying to change that view."

Analysis

Writing to learn is nothing new in training scientists, though it is rare in the secondary school classroom. Teaching scientists, many of whom might ask students to write only short, informational answers on tests—if they assign any writing at all—will speak fondly of the journals or logs that they kept in college and graduate school. Indeed, though much of the history of science is traced through the personal, speculative writings of such giants as Einstein (French, 1979), researchers have found that only a tiny fraction of the

writing done by U.S. science students at the secondary level is in this form (Applebee, 1981).

Speech, of course, is also largely neglected in the secondary school science curriculum, where the silent note-scribbler is the usual student role. The partner system within many labs does promote the functional use of spoken language, but, again, research—primarily British—has found that talk does not further scientific thinking as long as students are doing the imitative, unoriginal "experiments" of most high school and college freshman courses (Martin et al., 1977).

The same research has suggested that both talk and writing become powerful learning tools when the reigning idea of science within a given classroom is of a dynamic, venturesome, passionate human activity in which initiative and uniqueness are rewarded. In such projects as the "oil company drilling report," Rich Gottfried defines science as an exacting process of knowing—available to everyone—rather than as a text full of static "facts." The talk within Gottfried's groups sparks original solutions, reactions, and syntheses; this talk informs the writing, which in turn informs the talk. Gottfried's attitude toward lab reports—"I give more credit to a careful argument supporting the wrong results than to a hasty argument supporting the right ones"—also pushes the student to think, not parrot. A research atmosphere is created: The student whose solution fails to precipitate or whose culture fails to grow is free to consider carefully *why* the experiment turned out that way; he or she does not fudge data to pretend that everything went "perfectly."

As Stephen Judy (1980) has stated, "The science teacher need not know a great deal about English to teach science writing and reading." Nor does he or she need a background in speech theory to use talk profitably in the classroom. Gottfried's techniques come primarily out of his experience as a scientist and through years of teaching. He teaches them to other teachers through seminars. By the same token, these techniques and others are not so esoteric to professional scientists that they cannot be applied to any course in any discipline. Gottfried's point is that students emerge from his courses with skills that they can use anywhere.

In a way, Gottfried, and others like him, are doing what some might still call the English teacher's job only: They teach students to become better writers and speakers (and readers and listeners). The students develop these abilities because Gottfried, like the best elementary teachers, makes language modes indispensable to the student's learning. Students write and speak well because their desire is so strong both to understand and communicate.

More ideas

- **The Think Book** (developed by Anne Miller Wotring). Besides, or in lieu of, taking notes, students keep a regular journal in which they record observations, synthesize data, discover problems in understanding ideas, and try to solve them. Like the professional scientist's log, the think book teaches students to write for

themselves. The book works best when the teacher encourages students to bring to class questions that have been sparked by the writing. These questions form the basis for conferences or class discussions. Teachers who have used this device report that student questions are more precise (thus more easily answered), and the entries in the book allow the teacher to see how the student has arrived at his or her quandary.

- **Thought experiments.** These are based on Einstein's 'gedanken-experimenten," which he credited for his, or any other scientist's, ability to do original research. The goal of these creative exercises is to have students attempt to explain phenomena in original ways, even if they at first seem implausible. Einstein felt that without such exercises his imagination could not have been agile enough to have conceived an alternative to Newtonian physics.
  Thought experiments can be introduced to classes in innumerable ways. For example, before earth science students have been introduced to storms, the teacher might begin a class with the question, "What is hail and what causes it?" The teacher might then ask students to speculate an answer in writing, assuring them that this is a brainstorming session—all answers are acceptable. When everyone has written, each person (or several volunteers) reads the speculations aloud; the class compares alternatives in open discussion. This experiment engages the minds of students in the topic and gives each person a paradigm against which to test the data and concepts to be presented in the assigned reading.

- **Mental exercises.** Another excellent way to stimulate this engaged flexibility is to do with students some of the mental gymnastics detailed by William Gordon's *The Metaphorical Way of Knowing* (1966) or Robert Ornstein's *The Psychology of Consciousness* (1972). In addition to mental exercises, Ornstein includes simple optical experiments which help to teach students how the brain processes information and controls attention.

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"KEEN, COOL, AND REFRESHING": WRITING AND SPEAKING TO LEARN IN MATHEMATICS

Observations: Geometry I, 8:45 a.m., January 28, 1982

The class has just ended, and Ralph Smith has asked me if I want to review students' writing. So, while he teaches General Math, I sit at a table in the conference area and read. Nearby, a counselor lectures to a sleepy-looking bunch of juniors about taking the SAT.

Smith has asked his kids, mostly freshmen, to write during the last 12 minutes of class about their feelings—anything. The students expect him to read at least some of the pieces to the class the next day, because one note said, "Read aloud!" and several said, "Please don't read to the class."

I am impressed by their honesty—and ability to write. Few spelling errors, no clumsy sentences—obviously they are at ease with the assignment. What do they write about? Boyfriends, girlfriends, friends; but mostly, they write about why they do not want to take the test tomorrow—why it is unfair. Others write: "I'm tired," "I'm confused," "I'm in a daze," "I want to go home"—responding to the malaise of winter, end-of-quarter exams, and frequent snow delays. A few were very deeply unhappy. One said that she was unprepared, would get a low grade, and, consequently, suffer "child abuse" from her mother. She wanted this read to the class. One person said, "I find geometry keen, cool, refreshing."

9:30 a.m. Smith says that he will ask for a more focused writing in the 9:45 Computer Science I class—mostly 11th- and 12th-graders. Feelings about the subject, rather than about "anything and everything." He says that the mood in this class has been upbeat, not so overcome by weather and school pressures. He wants the writing to tell him about particular problems that they have with the material, which is much tougher than most of them expect. He adds that during the semester they have had practice with both types of personal writing.

9:45 a.m. Students enter the classroom, alone, in pairs, and chatting. Some enter from the adjoining computer room, where they have already been working on the latest programs, or kibitzing while others program. In the few minutes before class officially begins, two or three ask the teacher to look over their program drafts; a few revisions are made.

The chatter ebbs when Smith begins talking about the next day's oral reports. Each student (some work in groups of two or three) will describe his or her latest computer project: how he or she has designed the program, what programming problems have been discovered. Though the class has known about the reports for several weeks, and most are prepared, the reminder is met with a few grumbles and several expressionless nods. Evidently, the mood takes Smith somewhat by surprise. The personal writing assignment that he gives the class next is quite similar to the open-ended one that he assigned earlier:

I'd like us to relax for a few minutes and collect our thoughts . . . . When you feel you're ready, do some writing . . . about anything that's on your mind . . . something that's bothering you . . . something you feel good about. Then, if we have time, I'll read some to the class. (One student says, "Yes, read them!") Now some of you will say, "Wait a minute now—I don't want this read." I respect that. We'll read them aloud, unless you don't want to.

The class responds immediately. Some begin to write, one group of three decides to write together (smiling conspiratorially), others talk. Eventually, all are writing, glancing around for inspiration, writing again. One person looks up: "What if I don't have anything to write?"

"Just write that down," says Smith. "Just say you don't."

"It's just that I've been writing all morning."
"O.K."

One girl, head close to the paper, just writes and writes. Some finish, hand their papers to the teacher, then drift off to the computer room for a few minutes until all are done.

Smith reads each writing to the class. He carefully avoids those marked "Please don't read." The concerns of these somewhat older students differ from those of the earlier class:

Dear Mr. Smith,
The class is going fine. Only we need more time on the computer. We can't debug our programs.

Physics is giving me an ulcer and I'm frustrated about this class, but I was accepted to Tech yesterday. Now if only I'd hear from UVA!

Computer science really boggles my mind at times. Before I took this course I was considering going into a career involving computers—but now I'm not sure!

Three (the conspirators?) say, "Forget the reports—let's party!" Another quips, "There's $100 in it for you if you give me an 'A' for this quarter." (Laughter occurs when this is read.) And one, which draws bigger laughs, waxes proverbial:

Everytime I think I see the light at the end of the tunnel, it turns out to be an oncoming train. In the dog race of life I sometimes feel like a fire hydrant.
LYNCH'S LAW: When the going gets tough, everyone leaves.

During the rest of the period, teams of students take turns on the two computer terminals. Those groups waiting look over their programs, trying to "debug" (revise) them before testing them out on the machine. Some students remain in the classroom, working on programs or the upcoming reports. The teacher circulates, responding to requests for assistance.

One pair, at a terminal, puts in the program for an original battleship game. While Theresa works the keyboard, John watches for errors. When the machine rejects a command, they discuss how to revise the program. They ask for help from a nearby student; soon the program is clicking again. I glance at the pages still to be fed in. There must be at least five pages of closely written instructions, all numbers, letters, and punctuation. I ask John, "How long have you two been studying computers?" "Four months," he says. I'm dazzled. "How have you learned so much?" "Oh," he laughs, "I don't know anything!"

Analysis

"That's right," Smith says later. "Most of them will work hard for several months, learn a tremendous amount, and still not see any progress. That's one of the reasons I started having them do personal writing. I needed a way to know when they were feeling things like that, and I decided that maybe they'd put on paper—confidentially—what they might not *say* to me. And that's what's happened. When they write about their struggle with the subject—and these math courses are hard—I make it a point to boost them, show them how far they've come."

"But the writings are anonymous," I say. "Do they want you to respond?"

"That's interesting. I do keep the assignment anonymous, and to them that means I respect their privacy. But I know pretty much who's written what, and they know that I know. So, yes, they do appreciate the response."

"When did you start using the writings?"

"It was 3 years ago, in a geometry class. We'd had a test, and most of the students had done poorly. The day I told them the results, the tension was thicker in that room than in any other class I could remember. So I hit on the idea of the in-class writing as a fairly painless way in which they could express their frustrations about the course, the math, or my teaching.

"In fact, one of the students in this class today was there then. She was, and still is to some extent, one who would rarely speak in class or bring me a problem. But when I started asking for the writing, she opened up on the

page, and still does." (This was the same student I'd seen writing so avidly before.)

"What was the result of the writing in that class?"

"Well, besides improving communication between them and me, I could see that after a while, it definitely improved the atmosphere. The writing seemed to relax the class, to make them more ready to do geometry. I guess you could say it removed a block to their learning."

"Have you changed the assignment since then?"

"I don't think I read the pieces aloud at first. But I started soon thereafter—you can see how much they like it. Some of the students write for the whole group—'Let's party,' for example—because they really want to lift everyone's spirits, lighten the mood. But I think that everyone wants to *hear* what's been written, because they really need the assurance that others are feeling what they're feeling. This is a pretty lonely time for many of them."

"Have you tried any other variations of personal writing—learning journals, for example?"

"I haven't yet, but I'm planning to, next semester. I think that regular entries in a journal would be an even better way of showing students that they come a long way in a semester, even in a day, sometimes. It would also keep me in pretty constant touch with the specific problems they're having with the material."

"How often do you have the students do the personal writing now?"

"I've been doing it about once a week, usually on Fridays. We spend about 20 minutes of the period, but its usefulness is much greater than the time spent. You can tell how good it is for the class just by observing the mood. For me, well, it's helped bring me closer to the students, to an understanding of what they *don't* understand, so in that way I'm a better teacher."

Analysis II

According to the comprehensive study by Applebee (1981), personal, expressive writing in secondary math classes is rare in this country. Nevertheless, its value is acclaimed not only by practitioners such as Ralph Smith, but also by researchers (e.g., Britton, 1970, and Emig, 1971) who see this type of writing as absolutely essential to the growth of language and learning.

Equally rare, but equally noteworthy, is the kind of oral interaction that attends this writing. That Smith reads the writings to the class influences *what* and *how* many of the students write. The students who worked together on

"Let's party"—and the girl who wanted Smith to read about child abuse—were striving for an effect much different from, though just as important as, the goal being sought by those who wrote, "Please don't read aloud." Moreover, Smith encourages this dramatic use of the writing by allowing time for laughter or chatter that follows his reading of individual pieces. These interactions help achieve one of Smith's (and the class's) main goals: re-creating a positive, cohesive spirit.

Without giving undue credit to Smith's handling of the personal writing, one can observe how this spirit pervades other activities of the computer science class. The mood is relaxed, respectful, full of purpose. No one resents anyone's time on the (only) two terminals, or feels imposed on by kibitzers or by a request for assistance from another group. I felt completely at ease, with several students asking me about my research—and being keenly interested in what I said—just as I talked with several of them about their programs.

More ideas

- **Response, revision, and editing groups.** Just as these have been boosts to learning in writing, social studies, and science classes, so can they be in mathematics, whenever creative problemsolving is required. Such groups, well-described by Hawkins (1976) and Elbow (1973, 1981), benefit the individual by providing multiple, constructive views on his or her work. These groups can reinforce the idea that math is a creative tool because the group process emphasizes the different methods by which problems may be solved, rather than the errors in a particular technique.

- **Two-step in-class response** (Paik, 1981). When a difficult concept is being introduced (e.g., standard deviation in statistics), the teacher begins by asking the students to solve a practical problem that requires knowledge of the concept (e.g., "Is it valid for a cereal company to say, 'This box contains 10 percent more raisins'?"). After students attempt to solve the problem based on their prior knowledge, the teacher explains the concept and solves the problem. *Then,* the students write once more, *explaining the concept in their own words and why it has solved the problem.* If students discover that difficulty remains, they ask questions in class, encouraged by the teacher.

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"LIKE ME, WHEN I WAS HER AGE": WRITING AND SPEAKING TO LEARN IN SOCIAL STUDIES

Gail's Log (December 10, 1981):

> **Today's class was confusing! Jerry and Mrs. Yalen role-played about a partner and another kid whispering over the partner's third interim. The partner was very scared of facing his parents with all the interims, so he wanted his friend to forge the signatures at lunch. You, as the labber student counselor, overhear the conversation and know that something must be done. Thinking to myself (when Mrs. Y and Jerry asked how we would have handled it) I would have come right out and said, "Now, Billy (or whoever), do you really think that's honest? Your parents are probably very concerned as to how you're doing in school." It turned out that when they asked Martha to role-play as the labber giving her thoughts to the partner, she started out a totally different way. Not even letting her partner know that she overheard the whispering. Am I wrong? Gosh, I'm getting so confused! I'm taking this lab program like it's right from a book—telling you exactly what to do without experiencing and learning from action. I *know* I have to let these things work out and develop a technique.**

* * * * * * *

At Lake Braddock (Va.) Secondary School, teachers Tina Yalen and Alice Marsala have given behavioral science students the chance to learn not only from books, but also through action. Every year for the past 7, each of the 140 students in the 10-month introductory course has spent December to June working in one of three unique programs that develop courage and creativity by challenging both.

One program, the largest, is class-based. A typical project for these students is "Adolescent Issues: Course Design," in which groups of four devote 2 weeks to planning, evaluating, and revising a hypothetical new junior/senior course in behavioral science. Consulting frequently with the instructor, each group prepares drafts and a "finished product" that includes:

A. an organized, structured outline of some form, revealing your syllabus content, in sequence and with lengths of units clearly indicated . . . each unit should have its issues clearly stated . . . .

B. a detailed description of five lessons for any of your units. Be sure the objective and the process are clear for each lesson.

Another project uses the novel, *The Catcher in the Rye*. The class discusses the question, "Is this novel accurate to adolescent experience?" Yalen and Marsala challenge the students to justify their assertions by comparing Holden Caulfield's words and views to their own. Sometimes the topic produces unforeseen results: This year, the class has become so incensed over the inaccuracies of a filmstrip based on the novel that they have decided to produce their own for future classes. Parts in the "play" have been assigned, a script is being written, and scenes "on location" in Washington, D.C., are being chosen.

The second of the three programs, one for which students are carefully selected and trained, takes them off campus four mornings a week to work with the handicapped at the nearby Northern Virginia Training Center. Marsala heads this program, which also includes a biweekly seminar at which the students discuss their work and its attendant joys and problems. Biweekly, Marsala responds to the copious journals the students keep to describe and reflect.

The third program, like the second in that care is taken to choose and train participants, sends 24 students into seventh- and eighth-grade classes as "partners" of individual boys and girls. Yalen, who directs this phase of behavioral science, coordinates the pairing with classroom teachers who have identified students who could profit from, and are receptive to, a "Big Sister or Brother" relationship with an older student. For four mornings a week, one period per day, each "labber" (student participating in this program) attends class with his or her partner. For a few minutes before and after class, the pair converses about the younger student's schoolwork, which is usually suffering because of problems within school and out. The program has lasted 7 years because the older students have succeeded in raising the confidence—and often grades—of their younger partners. Moreover, the students gain tremendous insight into themselves and those that they work with—far more than they could gain in a conventional course.

Crucial to the success of this third program is the month of training which precedes it. Yalen and guidance counselor Jerry Newberry lead each of two groups of 12 in various role-playing exercises (such as that reported by Gail in her log that began this section). They also lead seminar discussions of typical situations the labbers will face. During training, students begin 4-day-a-week logs, one key to their leaps in insight *and* their best means of keeping in contact with Yalen during the ensuing 4 months. Some training time is spent talking about how to keep a log. One instruction that always stays with the students is Yalen's warning to avoid "glop": sentences like, "It was okay," or "He's nice," that hinder careful analysis.

Every 2 weeks throughout the program, Yalen comments on the logs in writing, briefly and positively, entry by entry: "Don't be so hard on yourself! You're making progress"; "I feel the same way myself"; "That's quite a breakthrough! How's she doing in science?" Augmenting this written dialogue are the biweekly 1-hour seminars which give the labbers a chance to compare notes and solve common problems. Kelly writes about one of these—and much more—in a log entry:

Today we had only 20 minutes to work with. I love these meetings because I like to hear how everyone else is doing with their partners. David sounds like he has it made in the shade—he should be very proud of himself as well as his kid! When Jerry asked if anyone was bored, saying someone must be, I spoke up. Wow, whenever I talk out in the open about Lana, I always say 'she never talks.' Why do I say that? It's not really true—Lana does have her days when she seems really comfortable and more open to talk. Why do I expect so much? I seem to be waiting for her to make the move to 'let out her guts to me.' Since Lana is a rather quiet girl (LIKE ME WHEN I WAS HER AGE), she is obviously not gonna start the talking! Kelly, it's your job to start things off and get her talking a bit. Part of the key to do that is to open up your feelings—showing her you trust her.

By June, every student has recorded more than 100 descriptive-introspective entries, received 12 sets of written comments, and taken part in more than 12 seminars—in addition to the four meetings per week with the partner. They are ready to undertake Yalen's final exam: a multipage, multifocused assessment of their work. More than a test, this last, take-home project is meant to synthesize months of experience, to define the great growth that has occurred:

A. Identify the physical, mental, emotional, and social characteristics of an early adolescent, based on your observations . . . .

B. . . .describe your responses, feelings, attitudes, and behavior as it relates to being with young adolescents . . . .

C. . . . discuss any evidence of change in YOURSELF since lab began . . . .

D. . . . discuss any evidence of change in your lab partner . . . .

E. Describe your accomplishments. Be a good lawyer in your own defense.

F. Describe your disappointments and/or failures . . . in yourself . . . in your partner . . . in your situation . . . .

G. From among several "critical or crucial" days . . . select the ONE which may well have been the turning point in the relationship and discuss why it was so crucial . . . .

H. Compare/contrast the first 2-3 weeks with the last 2-3 weeks.

Elizabeth, a participant in 1980-81, summarized her experience in part H of her exam:

> **The first two weeks and last two weeks of Lab are so different, it's difficult to believe there's only five months difference between the two. The first two weeks I was extremely paranoid about wanting to be the perfect Labber. My biggest concerns were Tom's grades and what I was supposed to talk about. I had my teacher and mother records on all the time. I also had some serious doubts about whether I was doing the right thing. I expected miracles, and fast miracles at that. And I was devastated by every little disappointment.**
>
> **The last two weeks of Lab, I was mainly concerned with strengthening our friendship and using every second of our final days in a constructive way. I quit worrying about his schoolwork and put all my attention and concern on Tom, the person. Instead of wondering what to say, I wondered how I was going to say everything in two weeks. All doubts were gone, only the fear of Lab ending. There was no time left for miracles, just friendship, and love, and communication. I left the disappointments, such as bad grades, behind, and grabbed at every bit of encouragement Tom gave me. And in the end it all paid off. I started out doubtful and fearful, and ended up confident, ecstatic, and fulfilled.**

Analysis

Within the high school, Yalen's, Marsala's, and Newberry's programs are as close to being a "functional communication program" as an actual curriculum can be. Besides meeting many "literacy objectives" in all four language modes, the program does them all with no artificiality. Certainly, the training period, with its discussion, role-plays, and "active listening" exercises, contains nothing that the labbers do not need. Yalen has revised it over the 7 years to eliminate from this all-too-short period anything not absolutely essential. The logs, too, are entirely functional: The students need them to keep records, to communicate with the teacher, and perhaps most important, to maintain detachment from their emotions. Yalen needs to comment on the logs for similar reasons—communication, emotional support, her own objectivity.

The oral exchange within the seminar is also crucial. Kelly's entry, (quoted above) asserts this; my own participation in one of the seminars has reinforced the conviction. On the day that I sat in, we talked about how the students kept logs and how they had learned from them. What impresses me most about the talk within the circle was how each response acknowledged what the previous speaker had said. The seminar was obviously one of those rare situations in which ideas were carefully tested *and* everyone's self-esteem was protected.

Just as noteworthy for its functional communicating is the in-class pro-

gram. Aware that these students might perceive themselves as "rejects" from the two more glamorous programs, Yalen and Marsala have established the class as a lab in its own right. Its purpose is to help teachers redefine behavioral science, as subject and course, for future students. Such interactive projects as "Adolescent Issues: Course Design" and the filmstrip, "The Catcher in the Rye" contribute to meeting this goal. At the same time, the students become more aware of their personalities and actions, as these projects expose them to a wide range of human behavior patterns.

More ideas

Teachers inspired to assign logs, such as those used by Yalen and Marsala, might adapt the conditions which the students with whom I talked defined as best or getting the most out of the writing:

- **Logs work best when kept frequently**, at least every other day; from the logs I read, I noted that when days were missed, the students felt the loss.
- **Most students write best after school**, having put time and space between themselves and the events that they write about.
- **Students write best when relaxed**—whenever that time is for each person. "Relaxed" means "not thinking about how you write." The opposite of relaxed is "schooly," which means "worried about things like topic sentences and semicolons." These factors, agreed the students, hinder memory and the ability to analyze.

SUGGESTED READING

On functional communication:

Allen, Ronald, and Kellner, Robert. *Putting Humpty Dumpty Together Again: Integrating the Language Arts.* The Talking and Writing Series, K-12. U.S. Department of Education, 1983.

Cooper, Pamela, and Galvin, Kathleen. *Improving Classroom Communication.* The Talking and Writing Series, K-12. U.S. Department of Education, 1983.

On responding to ideas in student journals:

Staton, Jana. *Thinking Together: Language Interaction in Children's Reasoning.* The Talking and Writing Series, K-12. U.S. Department of Education, 1983.

STOPPING PLACE (not a conclusion)

This collection of scenes and opinions, and dialogues and suggestions has run out of room; we leave off here, but do not conclude. We hope that as you have read, you have been saying to yourself, "They (the authors) need to know about [a project] or teachers (or parents) as inventive and sensible as these." Please see this booklet as an introduction (or a further contribution) to the use of writing and speaking as tools of learning in the home and the school. There are teachers at every grade level in every part of the country who have discovered the values of writing and speaking to learn, and who realize these values in remarkably various ways—we have worked with some of these teachers. And, of course, there are hundreds of thousands of parents whose learning adventures with their children are as exciting as those described here.

The point of this booklet has not been to "cover the field." What we have tried to show—more than tell—is how easy, really how natural, it is for people to learn through writing and speaking. We have focused on five distinct environments in which this learning happens enjoyably and quite intensely. We merely suggest the range of environments in which it does happen, and the many more in which it could.

If the scenes described have reminded you of others, please let us know about them. And, by all means, please publicize them to other parents and teachers.

The 12 booklets in The Talking and Writing Series, K-12: Successful Classroom Practices are:

- *Putting Humpty Dumpty Together Again: Integrating the Language Arts*
  Ronald R. Allen and Robert W. Kellner

- *Improving Classroom Communication*
  Pamela J. Cooper and Kathleen M. Galvin

- *Writing Growth in Young Children: What We Are Learning from Research*
  Marcia Farr

- *Oral Communication in the Elementary Classroom*
  Barbara S. Wood

- *Talking and Writing: Building Communication Competence*
  Donald L. Rubin and Kenneth J. Kantor

- *Thinking Together: Language Interaction in Children's Reasoning*
  Jana Staton

- *Assessing Children's Speaking, Listening, and Writing Skills*
  Linda Reed

- *Using the New Technologies in Language Communication Education*
  Nancy S. Olson

- *Thinking Visually About Writing: Three Models for Teaching Composition, K-12*
  Charles Suhor

- *Oral Communication Instruction in Middle and High School Classes*
  Philip A. Gray

- *Learning Better, Learning More: In the Home and Across the Curriculum*
  Christopher J. Thaiss

- *Inservice to Improve Speaking and Writing in Grades K-12*
  Betty Jefferson Blaisdell